

Hints on digestion &

HINTS ON DIGESTION.

A BRIEF RESUMÉ OF THE LATEST PHYSIOLOGICAL
INVESTIGATIONS.

From various English American, French and German Physiological writings.



COMPLIMENTS OF
THE NEW YORK PHARMACAL ASSOCIATION,
No. 84 WEST BROADWAY,
NEW YORK.

CAUTION.

We regret that we are compelled to caution the profession in prescribing Lactopeptine, but very careful investigation has proven to us clearly the necessity of it.

There is no more honorable class of men than Druggists, but there are, nevertheless, quite a large number that are substituting their own compounds when Lactopeptine is prescribed, and others are filling prescriptions for Lactopeptine with compounds sold in the market claimed to be identically like Lactopeptine; but a careful analysis of each and every one of these shows that in most cases they are simply an inferior quality of pepsin. We have learned of several instances where Druggists have gone so far as to boldly ask the patient having a prescription for Lactopeptine to take some worthless compound, claiming it to be similar and CHEAPER. We consider such Druggists more honorable, however, than a large class who secretly fill their prescriptions for Lactopeptine with inferior mixtures of their own, or cheaper and worthless imitations manufactured by other firms, styling themselves Manufacturing Pharmacists.

SUGGESTIVE NOTES.

Lactopeptine is always UNIFORM, and its effects are SPECIFIC, and no one has ever been able to imitate its digestive value. If you do not obtain positive results when you prescribe Lactopeptine, you can be sure that some substitution has been made, and in such cases it may be necessary for the physician to prescribe Lactopeptine in the original ounce package to insure certainty of obtaining the genuine article. We can confidently make this assertion knowing the scrupulous uniformity in digestive value of every ounce of Lactopeptine.

Lactopeptine has always been kept strictly in the hands of the Medical Profession, never having been admitted in any publications but Medical Journals. It is prescribed by the most intelligent and educated physicians in all parts of the world, and there are but few physicians who have ever used Lactopeptine that will not agree with the late Prof. L. P. Yandell, when he says: "Lactopeptine is one of the certainties in medicine, and in this respect ranks with Quinine."

In the various forms of Dyspepsia, in Vomiting in Pregnancy, and in Mal-nutrition of children, there is no known remedy so positive in results.

HINTS ON DIGESTION.

A BRIEF RESUMÉ OF THE LATEST PHYSIOLOGICAL
INVESTIGATIONS.

From various English American, French and German Physiological writings.



COMPLIMENTS OF
THE NEW YORK PHARMACAL ASSOCIATION,
NOS. 10 AND 12 COLLEGE PLACE,
NEW YORK.

HINTS ON DIGESTION.

OUR apology for offering this monograph to the profession will be found in the universally expressed demand for a concise treatise upon the subject which shall be thoroughly up to date. Physiology and physiological therapeutics have made wonderful strides. As branches of science they are thoroughly abreast with the onward march of investigation. The experiments and conclusions, the primary theories from which accepted facts have been deduced, are scattered through the miscellaneous medical literature of both hemispheres. To cover the ground with anything like intellectual completeness, the physician must have ample time at his command, with ample means to provide himself with the home and foreign journals, and with sufficient linguistic knowledge to comprehend the results of the German and French laboratories. The conservatism of the past which relegated to the saliva the only converting power over starch, and believed that the transformation was effected at once without intermediate steps in the process, and the more recent assertion from men highly placed in the ranks of medical experts, that diastatic action was arrested in the presence of an acid, have given place to other views based upon such exact inquiry and experiment that they have been accepted as postulates of thought. It is our purpose to give in an epitomized form the salient features of this new departure in digestion. We believe that the labor will be appreciated by those who are unable to keep abreast with this one department in physiology, and that it will be kindly received by the majority of general practitioners. If it shall prove of service as a contribution to physiological therapeutics, we shall feel amply compensated for the exertion. The subject seems to divide itself naturally into the following heads:

1. SUBSTANCES USED AS FOOD.
2. SALIVA.
3. GASTRIC JUICE.
4. PANCREATIC JUICE.
5. INTESTINAL JUICES.
6. REMARKS UPON PHYSIOLOGICAL THERAPEUTICS.

The discussion of hydrochloric and lactic acids, and of the action of diastase in slightly acidulated and in alkaline solutions, will be noticed under their appropriate heads.

I. SUBSTANCES USED AS FOOD.

Organic substances used as food may be arranged under three heads: 1. The saccharine group, embracing substances composed of oxygen, hydrogen, and carbon, resembling sugar in composition, and readily convertible into it; such as starch, gum, woody fibre, and the cellulose of plants. 2. The oleaginous group, with a great preponderance of hydrogen and carbon, small proportion of oxygen, and absence of nitrogen, including vegetable oils and animal fats. 3. The albuminous group, containing a large proportion of nitrogen, comprising animal and vegetable substances allied in chemical composition to albumen and animal tissues. The saccharine substances taken as food do not directly form part of any animal tissue, but are decomposed in their passage through the circulation, and are thus employed in some unknown way in nutrition. Starch is converted into sugar during digestion, and the sugar thus formed is decomposed and appropriated. The articles of the albuminous group serve not only for nutrition, but for the maintenance of heat by their decomposition. It has been stated that some conversion of saccharine matter into lactic acid may occur within the alimentary canal. But this transformation does not take place to any considerable extent. Lactic acid so produced becomes absorbed and is subsequently mainly disposed of by undergoing oxidation within the system, as happens with the organic acids in general. It is as saccharine matter that the carbohydrates, in the ordinary course, reach the circulation, and the saccharine matter thus derived is conveyed by the portal system of vessels to the liver, where it can be shown to be detained and subjected to metamorphosis—which is the first step in its assimilation. The carbo-hydrate element of food is susceptible of undergoing conversion into fat, as shown by Boussinqualt, Pavy, and others; but in order that this may ensue, it must not be administered without a due accompaniment of the other alimentary principles. Nitrogenous matters in excess may also serve as a source of fat.

2. SALIVA.

Pure submaxillary saliva was first studied by Bernard. It is more viscid than that of the parotid, but is perfectly clear. Its organic matter is not coagulated by heat. He regarded its functions as exclusively connected with gestation. Parotid saliva contains organic matter, sulpho-cyanide of sodium, phosphate of lime, chlorides of potassium and sodium, and carbonate of soda. It is chiefly concerned in mastication and deglutition. Its secretion is rapidly generated by irritation of the fifth pair of nerves, and of the facial. The product of all the glands—the saliva proper—has a specific gravity of from 1.004 to 1.006, and its normal reaction is alkaline. It is essentially an aqueous solution of albumen, mucine, fatty matters, a trace of sulpho-cyanide of potassium, mineral salts, alkaline and earthy phosphates, and a peculiar ferment—ptyaline—urea has been detected in normal conditions, and glucose, biliary pigments, lactic acid, etc., have been found pathologically. The ferment of the saliva has the power of converting starch into sugar, and to determine whether it is properly active, the following test is used: a little boiled starch is made into a thin paste with water, and after the addition of about one-third part of its volume of the saliva, it is maintained at the temperature of the body—about 35°C. In about fifteen minutes a portion of the liquid is tested with Fehling's solution, and repeated several times, until there is satisfactory evidence of the presence or absence of glucose. Little is absolutely known of the activity of ptyaline, but it is closely allied to diastase. It was discovered by Leuchs in 1831, and called by its present name by Berzelius. Mialhe called it *animal diastase*. In the horse and in man the parotid saliva alone has not the power of converting starch into sugar. The case is the same with the sub-maxillary secretion of the dog. This converting power is the joint property of the entire buccal secretion, and in very slight degree is found in the mucus of the bladder, the blood, and muscular flesh. We shall also show further on, that particles of starch reaching the pancreatic and intestinal juices undigested, may be transformed by these secretions. Bidder claims that the converting property of ptyaline is developed only with the first appearance of teeth. Leeuwenhoek discovered certain *pyoid globules* in ptyaline which had

amoeboid movements, and closely resembled the white corpuscles. They may be regarded as ferments with saccharizing properties (Ronget has confirmed this view), while a heat of 60°C. does not precipitate it, as is the case with albuminoids. Frerichs and Cohnheim claim that this does not imply that it may not be destroyed by an increase of temperature. Schiff says the temperature must be raised to the boiling point. It is a well established fact, however, that any heat above 150° F. injures the diastase and its converting power, and that it is totally destroyed at a temperature of 180° to 190° F. Cohnheim has endeavored in vain to prove that ptyaline is not an albuminoid substance. Sulphocyanide of potassium was first discovered in the saliva by Treviranus. Eberle supposed that it was only produced under the influence of certain nervous or moral conditions. But the investigations of Ronget, Aehl, Sectoli and Schiff, prove conclusively that it is always present in human saliva. The influence upon the buccal secretions by innervation and by secondary arterial pressure is a very interesting study. From it we learn that it is not the irritation of the food upon the glands which first causes the flow of saliva, but the peripheral excitation of the nerve which is conveyed to the reflecting centre in the spinal cord. Schiff says that Bernard's assignment of peculiar mechanical action to each saliva is a little too sharply defined. It has been held until very recently that the converting power of the saliva ceased upon reaching the acid secretions of the stomach.

Dr. Fothergill wrote only a short time since: "Now, as it happens, 'diastase,' whether from saliva or barley, it matters not, is inactive in the presence of an acid, and taken into the acid stomach, as directed, is simply inert; simply thrown away, so far as it is a ferment, and reduced to the level of other food—no longer a digester, but itself to be digested." It is unfortunate that so erroneous an assertion should emanate from such an eminent practitioner. Küss says: "The amylaceous substances are changed into dextrine, and saccharized in the stomach by means of the saliva which is swallowed with the food. The quantity of saliva varies according to the continuation of mastication, a longer or a shorter time; thus, when the digestion is impeded, a larger or

smaller quantity of saliva is finally swallowed, and this assists the action of that which was swallowed with the food. This helps us to understand the difficulty, in artificial digestion, of operating upon the gastric juice alone, or unmixed with saliva." Recent experiments by Messrs. Chittenden and Griswold on the diastatic action of saliva under various conditions, have revealed the fact that human mixed saliva, in the presence of an equal volume of artificial gastric juice containing .05 per cent. of hydrochloric acid, is capable of forming from a given quantity of starch a much larger amount of sugar than the same quantity of saliva alone can do under a like degree of dilution; this being the more remarkable when it is remembered that the same percentage of acid by itself greatly retards the diastatic action. Messrs. Ely and Chittenden further showed that peptones exercised a decided influence upon salivary digestion, stimulating the ferment to increased action, particularly in the presence of acid. Thoroughly accurate tests have been made frequently within the past year, all of which prove beyond question of *reasonable doubt*, that the diastatic action is intensified in a slightly acidulated solution, and that the salivary digestion goes on in the stomach. The action of the pancreatic ferment upon starch will be studied further on. It is only necessary to state here that its power is even greater than that of ptyaline. These facts become the more apparent from the study of the constituents of an ordinary meal. Can it be possible that the saliva will only act upon the farinaceous principles during the brief time consumed in mastication and deglutition? If ptyaline will act only in an alkaline solution, what becomes of the potato salad, or of other starchy food that is mingled with claret, rhine wine, cider, etc.? What becomes of strawberry short-cake, apple tart, cherry pie, and other pastry that is mixed with an acid? The truth is that the process of digestion of the starch is only commenced in the mouth, and that it requires time for its completion, just as the other digestive principles require a certain period to finish their functions. *This time is furnished the saliva within the stomach.* That this is nature's law is supported by abundant proof.

3. THE GASTRIC JUICE.

The normal and characteristic secretion of the stomach is the gastric juice, which is chiefly produced by the glandular *culis-de-sac* of the cardiac region. It contains scarcely four per cent. of solid matter, two-thirds of which consist of organic substances (albuminoids). The salts chiefly found are phosphate of soda and chloride of sodium. Blondlot, of Nancy, was the first to study its properties through a *fistulous* opening, and this plan has since yielded very valuable results in the hands of Cl. Bernard and Schiff. The organic (albuminoid) matter contained in the gastric juice is a sort of ferment called *pepsin* or *gasterase*. It is soluble like ptyaline. Its existence was first discovered by Schwann. Payen obtained it by precipitation from the gastric juice by alcohol. Brucke denies its albuminoid character, just as Cohnheim denied the albuminoid character of ptyaline. It transforms albuminoid substances into *albuminose* or *peptone*, which is an isomeric form of albumen. Now, the presence of an acid is necessary for this transformation, which constitutes the digestive function of the stomach; in the gastric juice, therefore, pepsin is united with an acid in a free state. Prout, Schmidt, Mulder, Brinton, Ronget, Ritter, etc., claim that this is *hydrochloric acid*; Blondlot believed it to be an *acid phosphate of lime*; while Cl. Bernard and Barres will maintain that it is *lactic acid*. It is probable that both lactic and hydrochloric acids are present as well as butyric acid, these being the result of fermentative changes in the stomach. Lehmann also believed it to be lactic acid, while Schwann asserts that he has often found free hydrochloric acid. Letheby says: "It is very probable that the chlorides contained in the stomach are partially decomposed by lactic acid during the process of analysis, and thus the hydrochloric acid may, to some extent, be accounted for." The total acidity of the gastric juice is determined by the aid of a decinormal solution of sodium hydrate, the operation being performed as in the estimation of the degree of acidity in the stomach. The real acid of stomach digestion does not seem to be hydrochloric, since it has not the same reaction; but the real acids are probably the organic acids set free from the food. Küss writes: "It is quite possible that hydrochloric acid, the

presence of which is incontestably proved by chemical reactions, may arise from decomposition of the chlorides by the lactates." Caillot (thesis by Ritter) says: "A mixture of albumen and chloride of sodium is coagulated by lactic acid; as neither chloride of sodium nor lactic acid of itself produces this effect, the coagulation can only be attributed to hydrochloric acid, which is produced by double decomposition." Schiff has shown that the introduction of dissolved dextrine by the veins or the rectum promotes digestion by the stomach, the acidity of the gastric juice being increased. If this fact be true, the acid thus obtained in a larger quantity can only be the lactic acid (Küss). The real gastric juice is secreted under the influence of an albuminoid excitant (muscular flesh, fibrine, white of egg, etc.). According to Lucien, Corvisart and Schiff, these elements furnish an indispensable element in the secretion of pepsin. This is Schiff's theory of *peptogeny*. The *peptogens* are elements which are capable of being changed into pepsin. The final result of *porphyration* and succeeding liquefaction is the production of *peptones* or *albuminose*. Owing to the researches of Lehmann, Brücke, Meissner, Mulder, Schiff, etc., it has been discovered that the perfect *peptone* is a remarkably assimilable and endosmotic product: The real *peptone* consists of albumen which is not only *dissolved*, but also *transformed* (chiefly by *hydration*, according to Brinton). The *dyspeptone*, the *para-peptone*, the *meta-peptone*, are the successive steps in decomposition before reaching the definite *peptone*.

The following extract is borrowed from Küss: the production of the real *peptones* must not be supposed, however, to be one of those processes of transformation to which the organism alone, or some growth (pepsin) borrowed from the organism, can give rise. This transformation, like all the chemical transformations which we see taking place in plants and in animals, shows no such monopoly of power as theorists of all ages have agreed in attributing to the agents of life. *Peptones* may be artificially produced, and this frequently occurs in manufacture. The process is simple and speedy. Meissner obtained perfect *peptones* from muscular flesh, with casein, legumen, etc. (*albuminose by boiling*, E. Corvisart), by long decoction in Papin's digester;

the same process with white of egg yields metapeprone, which may be afterwards transformed by the stomach or by artificial gastric juice into genuine peptones. Peptones have also been produced by the action of ozone on the albumen of an egg and on casein (Gorup-Besanez, Schiff), but for this purpose the ozonized air must be made to pass during sixteen to twenty days through a solution of albumen and water; and this process, after all, yields only products resembling peptones; if injected into the veins of an animal, some of them will reappear in the urine (Schiff).

If we study the phenomenon of gastric digestion as a whole, we no longer find in it, element by element, the simple action which we have been examining: we know that the amylaceous substances continue to be transformed into sugar by the action of the saliva. The fats become slightly emulsive under the influence of the motions of the stomach, and by mingling with the porphyreous product of the solid albuminoids; but this emulsion is extremely unstable, and the drops of fat show a tendency to reunite in large masses, which float on the surface of the liquid. That is to say, the gastric juice dissolves the albuminous envelopes of the fat cells, whilst the temperature ($40^{\circ}\text{C}.$) at which digestion is carried on renders the solid fats fluid, but no real chemical change occurs. This physical action is intensified by the muscular movements of the stomach during digestion. The different albumens are transformed into different *peptones*, but there are some kinds which for a long time resist the action of the gastric juice: such as the cellular tissue of the muscles; and some, finally, as the cellulose of plants, which are refractory. The mingling of these different substances with a large quantity of gastric juice forms what has also been called *chyme*. But we see here, too, that *chyme* is not a substance immediately formed, but an extremely complex pulp, and not at all fitted to give an exact idea of the digestive action of the stomach.

4. PANCREATIC JUICE.

This is also called the *abdominal saliva*; as the structure of the pancreas resembles that of the salivary glands. It coagulates readily, being rich in albumen. It is alkaline, like all salivas, and when

brought in contact with the product of the stomach, impregnated with the gastric juice, it neutralizes the acidity and begins to act in its turn.

The identity of the pancreas and the salivary glands, even in an anatomical point of view, is denied by Giannuzzi, whose recent researches have led him to consider the pancreas as rather resembling the liver. "The excretory tubes of the pancreas have very thin walls, lined inside with a columnar epithelium. They have not the same connection with the secretory vesicles as the salivary glands; but they form around them a net composed of very fine tubes, which have no epithelium, and surround the pancreatic cells with their meshes. This net may be compared to that of the biliary ducts. The network of the excretory tubes of the different vesicles which form the same glandular lobule, have connections between them, and form a common network. The pancreatic vesicles have no coat. The pavement epithelium of the vesicles is formed of flattened cells, having a nucleus and a prolongation. In short, they are very similar to those of the salivary glands; their nucleus, however, is more easily perceived, and their protoplasm is more granular, and contains fatty granulations. The semilunar bodies in the sub-maxillary glands, described by Giannuzzi, and since discovered by Kolliker, Heidenheim, and Poll, in the salivary glands, are not found in the glandular vesicles." (See p. 221, Giannuzzi, "Comptes-rendus de l'Académie des Sciences.") — Kuss.

Kubne, Dmileski, Hoppe-Seyler and others, have shown that *pancreatine*, which is the active principle of the pancreatic juice, is a mixture of three individual ferments, having each an independent action: the first, precipitable by calcined magnesia, acts upon the fats; the second, separated by precipitation from a solution of collodion, is the ferment of the albuminoid substances; while the third, which resembles ptyalino, is precipitated like this latter by concentrated alcohol, and acts upon the amylaceous substances. Vulpian asks: "Is there any increase in the action of the pancreatic juice on the fatty substances, or are Schiff's results caused solely by the greater activity of the gastric digestion? Is it true that Stinstra admits (in a thesis drawn up under the direction of

Van Deen), that there is a larger deposit of fat in all parts of the body in animals whose spleen has been removed; moreover, according to Schmidt, the farmers in some parts of England have a custom of extirpating the spleen of calves, in order to fatten them more rapidly."

"The pancreas is an organ about which the pathological chemist has little to say as yet. Fatty degeneration and atrophy of the gland has been noticed by Bright, Frerichs, Catani, and numerous other observers, in some cases of diabetes. By some it is attributed as the result of that disease. I have suggested how possibly diminution of the pancreatic secretion may induce glycosuria, by diminishing the alkaline reaction of the blood in the portal vessels from the absorption of the contents of the jejunum not having been neutralized by this secretion. In cases of obstruction of the duct of the pancreas an increase of fatty matter has been noticed in the stools; but there are exceptions to this statement. The matter of chief clinical interest, which ought to be more fully worked out, is the formation of urea from the leucin derived from pancreatic digestion, and the formation of indol, and its appearance as indican in the urine. With regard to the latter, it has been shown that as salicylic acid puts a stop to the formation of indol in albuminoid solutions of pancreatic juice, so the internal administration of the same acid reduces the amount of indican in the urine, which decreases exactly in proportion as the quantity of phenol increases. Indican is also met with in the urine after ligation of the small intestines, and in obstructions and other affections of the intestines in disease. The indigo sometimes deposited in a free state in urine, sweat, and urinary calculi, is undoubtedly derived from the indol formed in the intestines by pancreatic digestion" (Ralfe).

The following interesting table and notes are taken from Roberts :

TABLE OF THE DIGESTIVE JUICES AND THEIR FERMENTS.

DIGESTIVE JUICES.	FERMENTS CONTAINED IN THEM.	ACTION ON FOOD MATERIALS.
Saliva,	Salivary Diastase or Ptyaline,	Changes starch into sugar and dextrine.
Gastric Juice,	$\left\{ \begin{array}{l} a. \text{ Pepsin,} \\ b. \text{ Curdling Ferment,} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Changes proteids into pep-} \\ \text{tones in acid medium.} \\ \text{Curdles the casein of milk.} \end{array} \right.$
Pancreatic Juice,	$\left\{ \begin{array}{l} a. \text{ Trypsin,} \\ b. \text{ Curdling Ferment,} \\ c. \text{ Pancreatic Diastase,} \\ d. \text{ Emulsive Ferment,} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Changes proteids into pep-} \\ \text{tones in alkaline and neutral} \\ \text{media.} \\ \text{Curdles the casein of milk.} \\ \text{Changes starch into sugar} \\ \text{and dextrine.} \\ \text{Emulsifies and partially sa-} \\ \text{ponifies fats.} \end{array} \right.$
Bile,		Assists in emulsifying fats.
Intestinal Juice,	$\left\{ \begin{array}{l} a. \text{ Invertin,} \\ b. \text{ ? Curdling Ferment,} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Changes cane-sugar into in-} \\ \text{vert sugar.} \\ \text{Curdles the casein of milk.} \end{array} \right.$

An examination of the table shows that a long and complicated series of ferment actions is required to accomplish the digestion of our food. Starch is attacked at two points—in the mouth and in the duodenum—by two ferments, salivary and pancreatic diastase, which are substantially identical. Albuminous matters are also attacked at two points—in the stomach and in the small intestine—but here the two ferments, pepsin and trypsin, are certainly not identical. The ferment, of which the only known characteristic is to curdle milk, is found in the stomach and by the pancreas—and, I think, also in the small intestine. The bile is not known to possess any true ferment-action, but it assists, by its alkaline reaction and by its physical properties, in emulsifying and promoting the absorption of fatty matters. The ferment which transforms cane-sugar, strange to say, is not encountered until the food reaches the small intestine.”—ROBERTS.

Roberts might even go further and state with truth that starch is attacked along the whole alimentary track. That its digestion may even go on in the gastric juice itself.

The ferment of the pancreas which transforms albumen into peptone is *trypsin*. It is the analogue of pepsin, but unlike that

principle, it only acts in *neutral, slightly acid* or *alkaline* solution. There is also a pancreatic diastase which transforms starch that passes through the stomach unconverted. If the aggregate of diastase of the saliva and pancreas act simultaneously, there will result a greater dissolving and dextrinizing power over a quantity of starch than they have the ability to completely convert into glucose. The emulsive ferment acts independently of acid or alkaline solutions. The nature of its action is probably physiological, and we may infer that, as the pancreatic juice loses its power over the albuminoids, its power over the fatty and the amylaceous matters becomes greater than before. In physiological therapeutics the pancreatic ferments are of inestimable service, because even the action of the gastric and pancreatic juices goes on within the intestine, and is not destroyed by the nature of the fluid holding them in solution.

5. INTESTINAL SECRETION.

The fluid secreted by the glands of Lieberkühn constitutes the *enteric juice*. Thiry's method of procuring it is now generally used. Its reaction is alkaline. Bidder and Schmidt say that it combines the activity and digestive power of all the other secretions—starch, fat and albuminous substances being all digested by it. Be this as it may, it is certain that a considerable portion of cellulose, starch, globules, and muscular fibre passes through the bowels unchanged. Dr. Lyon Playfair says that 1-12th of the nitrogen of the food, in the case of an adult man with good digestion, passes away with the excreta. In a dry state the fæces of man contain about 6.5 per cent. of nitrogen, and in the fresh state 1.7. In Ranke's experiments, it was ascertained that the nitrogen in the fæces was to that in the urine as 1 to 12.5. Bidder and Schmidt ascertained by experiment that meat and coagulated albumen contained in a muslin bag undergo, on being placed in the empty small intestine in which the bile and pancreatic juice are prevented by a ligature from descending, in from four to six hours' time, a considerable amount of digestion. Nitrogenous matter introduced into the upper part of the small intestine undergoes digestion in a very short time, and hence the *enteric juice* performs

a part supplementary to that of the stomach. Pavy says: "Besides its other functions, it serves to complete the digestion of whatever nitrogenous alimentary matter may have escaped the digestive action of the stomach; and it may be remarked that the same result—namely, the production of albumenose or peptone—occurs as when the solution has been effected in the stomach." The insoluble starches of food are converted by the saliva, the pancreatic and intestinal juices, into soluble and diffusible sugars; the various proteids are rendered capable of absorption into the blood by the gastric and pancreatic juices, and perhaps, also, the *succus entericus*, being changed into peptones. The fats are prepared for absorption by the bile and pancreatic juice by being in part reduced to a sufficiently minute state of subdivision (emulsion) to permit of their passage through the tissue interstices, and partly by being chemically altered into soaps (Quain).

6. GENERAL REMARKS.

From the foregoing it becomes evident that disordered digestion may depend upon, 1. Insufficient mastication. 2. Altered blood supply. 3. Nervous irritation. 4. Alteration of the saliva. 5. Deficient action in the gastric juice. 6. Pancreatic indigestion. 7. Intestinal indigestion. 8. Torpidity of the liver. Many years of study in this matter of digestion led the New York Pharmacal Association to institute a series of experiments in physiological therapeutics, which resulted in their giving to the profession a preparation of such scientific composition, that its sale has been unprecedented. Of lactopeptine, Prof. Atfield says:

LONDON, May 3, 1882.

"*Lactopeptine* having been prescribed for some of my friends during the past five years—apparently with very satisfactory results—its formula, which is stated on the bottles, and its general characters, have become well known to me. But recently, the manufacturer of this article has asked me to witness its preparation on a large scale, to take samples of its ingredients from large bulk and examine them and also mix them myself, and to prepare *lactopeptine* from ingredients made under my own direction, doing all this with the object of certifying that *lactopeptine* is what its maker professes it to be, and that its ingredients are in quality the best that can be obtained. This I have done, and I now report that the almost inodorous and tasteless pulverulent substance termed

Lactopeptine is a mixture of the three chief agents which enable ourselves and all animals to digest food. That is to say, *Lactopeptine* is a skillfully prepared combination of meat-converting, fat-converting, and starch-converting materials, acidified with those small proportions of acids that are always present in the healthy stomach; all being disseminated in an appropriate vehicle, namely, powdered sugar of milk. The acids used at the factory—lactic and hydrochloric—are the best to be met with, and are perfectly combined to form a permanent preparation; the milk-sugar is absolutely pure; the powder known as "diastase" or starch-digesting (bread-, potato-, and pastry-digesting) material, as well as the "pancreatine," or fat-digesting ingredient, are as good as any I can prepare; while the pepsin is much superior to that ordinarily used in medicine. Indeed, as regards this chief ingredient, pepsin, I have only met with one European or American specimen equal to that made and used by the manufacturer of *Lactopeptine*. A perfectly parallel series of experiments showed that any given weight of acidified pepsin, alone, at first acts somewhat more rapidly than *Lactopeptine* containing the same weight of the same pepsin. Sooner or later, however, the action of the *Lactopeptine* overtakes and outstrips that of pepsin alone, due, no doubt, to the meat-digesting as well as the fat-digesting power of the pancreatine contained in the *Lactopeptine*. My conclusion is that *Lactopeptine* is a most valuable digesting agent, and superior to pepsin alone.

JOHN ATTFIELD."

FORMULA OF LACTOPEPTINE POWDER:

Sugar of Milk, 40 ounces.	Ptyaline or Diastase, 4 drachms.
Pepsin, 8 "	Lactic Acid, 5fl. "
Pancreatine, 6 "	Hydrochloric Acid, 5fl. "

This combines the five agents of digestion as they exist in the human system in very accurate proportion. It meets every disordered symptom upon which a generally depraved condition of the alimentary tract depends. Pepsin alone, diastase alone, pancreatine alone, mineral acids alone, do not meet the indications. There must be a harmonious blending of all the digestive agencies if the physician hopes for success. In the reflex dyspepsias, either from pregnancy or uterine disorders, *Lactopeptine* in combination has not its equal. Its power is unique among the host of so-called specifics. As a scientifically compounded preparation it has naturally had many imitations, none of which have taken from its popularity, since the value of *Lactopeptine* was brought more prominently before professional notice by the embarrassing failures of the imitations. From time to time we have sent out pamphlets

containing the endorsements of the best men in the profession in both hemispheres. We have taken this new departure to show from a study of the physiology of digestion how perfectly Lactopeptine satisfies the demand in this division of physiological therapeutics. It supplements the action of the ptyaline, it reinforces the gastric juice, it lends additional power to the pancreatic juice, and assists the enteric secretion. There is no other preparation known which claims for itself this logical combination. Its value must be apparent to every intelligent practitioner, and the fact that over seventy-five per cent. of physicians prescribe it bespeaks for it unusual power. We shall, from time to time, issue other pamphlets containing new theories and experiments.

We know that frequent substitution is made when physicians prescribe Lactopeptine, and we desire to caution them very particularly upon this point. Some unprincipled druggists substitute cheap compounds, purporting to be made after our formula, which are sold in the market for the purpose of being substituted when Lactopeptine is prescribed. Most of these imitations are comparatively worthless. Some of them, instead of containing what they purport to, are composed of simply an inferior quality of pepsin. Our analyses and tests show that this pepsin is composed of nine parts of peptone (digested stomach) and but one part of pepsin. Other druggists put up for Lactopeptine pepsin alone, and others still mix pepsin and pancreaticine together, and fill their prescriptions for Lactopeptine with this combination.

In some instances where physicians have complained that they did not get as good results as formerly in prescribing Lactopeptine, we have traced their prescriptions direct to drug stores where the preparation was obtained, and the proprietors have admitted that they used another article which they supposed to be like Lactopeptine.

We are happy to state, however, that druggists as a class are an honorable body of men, and are not disposed to sanction any such petty dishonest practices when they are made acquainted with the true facts in the case.

A large portion of the pepsin sold in the market contains nine parts of peptone to one part of pepsin. When the animal is killed,

the pepsin immediately commences to dissolve the tissues of the stomach, and this digestion continues as long as the animal heat remains above 60° F., and in the summer season until a large portion of the stomach is digested. In the ordinary mode of separating the pepsin from the stomach, the peptone or digested stomach is separated with it, and thus it is that most of the pepsin in the market is nine parts of peptone to one of pure pepsin, and this so-called pure pepsin is sold for \$4.00 per lb., while absolutely pure pepsin cannot be produced for less than \$40.00 per lb.

The component parts of Lactopeptine are pure, and uniform results will always be obtained, and its effects will always be positive, when prescribed in appropriate cases.

PROFESSIONAL OPINIONS OF LACTOPEPTINE.

There has probably been more written by the medical profession in commendation of Lactopeptine than any pharmaceutical production of this century. The matter from medical and pharmaceutical publications, together with communications direct from physicians, would fill a book of four hundred pages of this size.

We have selected a few, showing the general character of all, and present them in the following pages :

The undersigned, having tested the preparation of pepsin, pancreatine, diastase, lactic acid, and hydrochloric acid, made according to published formula, and called Lactopeptine, find that in those diseases of the stomach where the the above remedies are indicated it has proven itself a desirable, useful and well-adapted addition to the usual pharmaceutical preparations, and therefore recommend it to the profession.

NEW YORK. April 6, 1875.

ALFRED L. LOOMIS, M.D.,
*Professor of Pathology and Practice
of Medicine, University of the City
of New York.*

LEWIS A. SAYRE, M.D.,
*Professor of Orthopaedic Surgery and
Clinical Surgery, Bellevue Hospital
Medical College.*

SAMUEL R. PERCY, M.D.,

*Prof. Materia Medica, New York
Med. College.*

F. LE ROY, SATTERLEE, M.D.,
PH.D.,

*Prof. of Chem., Mat. Med. and
Therap. in the N. Y. College of
Dent.; Prof. of Chem. and Hy-
giene in the Am. Vet. College, etc.,
etc.*

ALBANY, N. Y., June 8th, 1878.

I have given LACTOPEPTINE a good, thorough trial, and have been greatly pleased with the excellent results that have followed its administration.

A. VAN DERVEER, M.D.,

*Prof. of the Prin. and Prac. of Surg., Albany Med. College;
Surg. Albany and St. Peter's Hospital.*

PHILADELPHIA, PA., May 30th, 1878.

I have found great satisfaction in the use of LACTOPEPTINE, and have ordered it frequently in cases of dyspepsia, especially where there is want of tone and defective secretion.

JOHN H. PACKARD, M.D.,

Pres. Pa. Co. Obstet. Society; Surg. Episcopal and Women's Hospital.

PHILADELPHIA, PA., June 20th, 1878.

I have used LACTOPEPTINE with very good effect in a number of cases of dyspepsia.

JAS. AITKEN MEIGS, M.D.,

*Prof. of the Institutes of Med. and Med. Juris.,
Jef. Med. School; Phys. to Penn. Hos.*

CINCINNATI, O., June 21st, 1878.

I have used LACTOPEPTINE with great advantage in cases of indigestion.

W. W. DAWSON, M.D.,

*Prof. Prin. and Prac. Surg., Med. Col. of Ohio;
Surg. to Good Samaritan Hospital.*

LOUISVILLE, KY.

Your Liquid *Lactopeptine* and Syrup *Lactopeptine Compound* are the most elegant pharmaceutical preparations which I have ever seen. The efficacy of *Lactopeptine* in appropriate cases is an established fact. It is one of the best remedies in medicine and in this respect ranks with Quinine. For delicate women who require nourishment and digestants, I know of nothing which equals your Syrup *Lactopeptine*. I am never without *Lactopeptine*, and, being an habitual dyspeptic, am constantly compelled to use it for relief.

LUNSFORD P. YANDELL, M.D.

MOBILE, ALA.

I am greatly in the habit of using *Lactopeptine*, and in fact, hardly know how I could get along without it. I also find it valuable in promoting digestion with patients using full doses of Quinine. I am sure your liquid *Lactopeptine* preparations will give me all the satisfaction I desire, since *Lactopeptine* is the base.

C. H. MASTIN, M.D.

LEBANON, OHIO.

I personally regard *Lactopeptine* as one of my stand by, as much as to quinine or salicin. Indeed, I think I use *Lactopeptine* more constantly than any other drug.

EDWARD B. STEVENS, M.D.,

Editor Ohio Medical Journal.

NASHVILLE, TENN.

I cheerfully commend *Lactopeptine* as an invaluable remedy in many diseases of the digestive organs.

R. W. STEGER, M.D.,

Professor Chemistry and Microscopy, Vanderbilt University.

INFIRMARY HOUSE, WEXFORD, ENG.

An old dyspeptic patient of mine called just as your *Lactopeptine* reached me, and I gave him four ten grain doses. This morning he called again, and begged me to give him some more, *as he never received such relief from any other medicine.*

H. H. BOXWELL, M.D., F.R.C.S.I., L.M., etc.

MANOR CHAMBERS, BRADFORD, ENG.

I have prescribed *Lactopeptine* for many years, and carefully noted its admirable qualities. In some cases of atonic dyspepsia, especially in connection with anemia, I have found most excellent results to follow from the use of this *digestion-compelling medicine*, if I may make use of such a term as expressive of its powerful action. As it restores the digestive function and improves the condition of the blood, it is a *curative agent*, and *not merely palliative* and temporary.

REGINALD G. ALEXANDER, M.A., Can. M.B.

*Hon. Senr. Phys. to the Bradford Infirmary,
Consulting Phys. to the Lords of the Admiralty.*

St. Louis, Mo.

I have used *Lactopeptine* extensively in my practice during the last three years, in many cases of deranged digestion, in Cholera Infantum, *Vomiting in Pregnancy*, etc. It has never disappointed me. *Lactopeptine*, in my hands, has proved itself a desirable and useful remedy, and I have no hesitancy in recommending it to my professional brethren.

J. K. BAUDUY, M.D.,

*Physician to St. Vincent's Insane Asylum, and
Professor of Nervous Diseases and Clinical Medicine,
Missouri Medical College.*

WEST DERBY, LIVERPOOL.

I have prescribed *Lactopeptine* in cases of Dyspepsia in severe cases of *Vomiting in Pregnancy*. I can only say that I have been practising medicine for twenty-five years, and I have used a variety of medicines in diseases of the digestive organs, and have found none equal to *Lactopeptine*.

M. P. COALDER, M.D.

TOLEDO, OHIO.

I have been using *Lactopeptine* this summer with surprisingly good results; have now a babe who takes five grains just before nursing each time during the day. The milk, which cannot be retained at all without taking the medicine, is perfectly digested, and although emaciated when beginning the treatment, is now fat and healthy.

W. C. CHAPMAN, M.D.

935 N. BROAD ST., PHILADELPHIA, PA.

Lactopeptine prevents flatulence, promotes digestion and assimilation of food. It thereby secures infants from Convulsions, Cerebral Disorders, Diarrhoeas, *Cholera Infantum* and a catalogue of ills. Its benefits are soon observed, and its use not generally long required, but may be continued without injury.

I. S. ESHLEMAN, M.D.

I have been using *Lactopeptine* in my practice for many years with most satisfactory results. I find the combination of *Bismuth* and *Lactopeptine*, in equal parts, a very useful remedy in Infantile Diarrhoea.

T. H. ASHBY, M.D.

TORONTO, CANADA.

As to the value of *Lactopeptine*, I can testify that the components of it come as nearly as possible to the natural gastric digestive principles. In the cases in which I have employed it, I have had reason to feel satisfied with the results.

JOHN E. KENNEDY, A.B., M.D.,

Professor Materia Medica and Therapeutics, Trinity Medical School.

KINGSTON, ONT., CAN.

I have used *Lactopeptine* in many cases of Dyspepsia, and particularly in the Summer Diarrhoea of infants, with the happiest results.

ALFRED S. OLIVER, M.D.,

*Professor of the Institutes of Medicine,
Royal College of Physicians and Surgeons,
Kingston, Ont., Canada.*

CHICAGO, ILL.

No other preparation of Pepsin, in my experience, has such certain and decided effect as *Lactopeptine*.

A. BROOKS, M.D.

TOLEDO, OHIO.

I have used *Lactopeptine* quite extensively in my practice since its first introduction, and have obtained very satisfactory results from it, particularly in the indigestion Diarrhoea of Infants. For several years I have discarded all other Pepsin preparations in digestive disorders, and have relied on *Lactopeptine* as the best attainable remedy in these affections. Its combination of the active principles of digestion, its ease of administration and its efficiency recommend it to the profession as a very desirable treatment of the gastric arrangements, especially in children.

G. A. COLLAMORE, M.D.

OPINIONS OF THE MEDICAL PRESS.

Lactopeptine is a representation of the natural secretions of the stomach. Its object being to assist digestion and assimilation of the various articles introduced into the stomach. The natural secretion which this represents, as all other secretions of the body, sometimes fails, and the most rational course is to supply this deficiency by an artificial product until nature can furnish the amount necessary.—*Chicago Medical Journal and Examiner*.

Pepsin, pancreaticine, diastase, lactic acid, and hydrochloric acid with milk sugar—such are the component parts of *Lactopeptine*. Surely the physiologist must contemplate a formula like this with satisfaction; for it embraces the most important of his discoveries relative to digestion, and shows how the fruits of his researches may be made to do good service in the department of practical therapeutics. This is the age of physiological medicine, and the New York Pharmacal Association has certainly proved its ability to meet the requirements of the time by bringing *Lactopeptine* before the profession. No physician who has tried it fairly in practice, or who has taken it in a severe paroxysm of dyspepsia, will ever be without it. It is a certainty.—*Louisville Medical News*.

Functional troubles of the stomach and bowels are overcome with more certainty, with greater promptitude and in larger number, with *Lactopeptine* than by any combination with which we are acquainted.—*St. Louis Clinical Record*.

Lactopeptine has been so generally tested, and has become so well established as a digestive of the highest power, that practitioners ought not to be without it. Indeed, it is of more frequent service in digestive troubles than any other one remedy which has been brought to professional attention. Its formula, as published upon every package, commends itself; and the experience of the most eminent practitioners in America and England especially attest its great utility. In several cases in which its use was thought to be indicated, we have been surprised at the marked benefit following its administration. *Lactopeptine* already contains hydrochloric and lactic acids—the other important physiological digestives—pancreatine, diastase and sugar of milk.—*Virginia Medical Monthly, Richmond, Va.*

We have given *Lactopeptine* a full and fair trial, both in private practice and in the hospital department under our medical care. As a digestive, it comes nearer the gastric juice than anything we have ever used. This preparation has continued to hold the high position accorded it by the best men in our profession, and to-day *Lactopeptine* is one of the indispensables in the materia medica of the active practitioner.—*Southern Clinic, Richmond, Va.*

LIST OF LACTOPEPTINE PREPARATIONS.

LACTOPEPTINE (Powder).

LACTOPEPTINE contains the five active agents of digestion—*Pepsin, Vegetable Amylase, Pancreatine, Lactic and Hydrochloric Acids*—combined in the same proportion as they exist in the human system. 1 dr. will digest from 8 to 10 ozs. of either albumen, fibrin, caseine or gelatine; emulsionize 16 oz. of cod liver oil, and convert 4 oz. of starch into glucose.

LACTOPEPTINE will be found far superior to all other remedies for Dyspepsia and kindred diseases.

Also particularly indicated in Anæmia, General Debility, Chronic Diarrhœa, Constipation, Headache, and depraved condition of the blood resulting from imperfect digestion.

FORMULA OF LACTOPEPTINE POWDER.

Sugar of Milk,.....	40 ounces.	Ptyalin or Diastase, ...	4 drachms.
Pepsin	8 "	Lactic Acid ...	5 fl. "
Pancreatine,.....	6 "	Hydrochloric Acid.....	5 fl. "

LACTOPEPTINE, Elixir.

One of the most palatable forms for administering *Lactopeptine*. It is superior to all other remedies in Dyspepsia, and diseases arising from imperfect digestion. Also particularly valuable in many forms of Diarrhœa, Vomiting in Pregnancy, Anæmia, General Debility, Constipation and Phthisis.

Each fluid ounce contains 38 grains of *Lactopeptine*.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Elixir with Bismuth.

A most valuable remedy in the various forms of Dyspepsia, Constipation and Nervous Debility.

Containing: *Lactopeptine*, 32 grains, Am. Citrate Bismuth, 8 grains, per fluid ounce.

DOSE.—One teaspoonful after each meal.

LACTOPEPTINE, Elixir with Strychnia and Bismuth.

A most valuable remedy in the various forms of Dyspepsia, Constipation and Nervous Debility.

Containing: Lactopeptine, 32 grains, Strychnia, 5-75 grain, Am. Citrate Bismuth, 8 grains, per fluid ounce.

DOSE.—One teaspoonful after each meal.

LACTOPEPTINE, Elixir with Calisaya.

This preparation will be found perfectly adapted in cases of general Debility, accompanied with loss of appetite. Used in Dyspepsia and Febrile Diseases of a malarious form.

Containing: Calisaya Bark, 50 grains, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—One tablespoonful after each meal.

LACTOPEPTINE, Elixir with Calisaya and Iron.

This preparation will be found perfectly adapted to all cases of general Debility, especially when the digestive organs are feeble. It is an efficient tonic and stomachic. Indicated in Anæmia, Dyspepsia, Chronic Diarrhoea, and all morbid conditions of the system.

Containing: Calisaya Bark, 40 grains, Pyrophosphate Iron, 12 grains, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Elixir with Calisaya, Iron and Bismuth.

This preparation will be highly beneficial in Dyspepsia, Anæmia, Female Debility, and as a general tonic. The addition of Lactopeptine will be found of the utmost value in all cases of enfeebled digestion.

Containing: Calisaya Bark, 40 grains, Pyrophosphate Iron, 12 grains, Am. Cit. Bismuth, 2 grains, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—One to two tablespoonfuls after each meal.

LACTOPEPTINE, Elixir with Cinchona, Iron and Strychnia.

Used as a tonic in all cases of Nervous and General Debility, especially when attended with loss of appetite. It has also been used with great success in Chronic Neuralgia.

Containing: Lactopeptine, 32 grains, Cinchona, 60 grains, Cit. Protox. Iron, 12 grains, Strychnia, 1-100 grain, per fluid ounce.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Elixir with Gentian and Chloride of Iron.

An elegant preparation combining the virtues of Gentian and Chloride of Iron, with Lactopeptine. A valuable remedy in General Debility, Anæmia, Constipation, and Chronic Diarrhoea.

Containing: Gentian, 4 grains, Proto-Chloride of Iron, 4 grains, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Elixir with Phosphate of Iron, Quinia and Strychnia.

A protected, general and nervous tonic, used in the various forms of Dyspepsia and all cases arising from imperfect digestion. Particularly adapted to cases of Fever and Ague and Neuralgia.

Containing: Phosphate Iron, 4 grains, Phosphate Quinia, 4 grains, Phosphate Strychnia, 1-8 grain, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Liquid.

One of the most palatable forms for administering Lactopeptine. It is superior to all other remedies in Dyspepsia and diseases arising from imperfect digestion. Also particularly valuable in many forms of Diarrhoea, Vomiting in Pregnancy, Anæmia, General Debility, Constipation and Phthisis.

Each fluid ounce contains 38 grains Lactopeptine.
DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE Wine.

This preparation will be found superior to all other remedies in Dyspepsia and diseases arising from imperfect digestion. Also particularly valuable in Anæmia, General Debility and Phthisis. Containing 12 Grains Lactopeptine, per fluid ounce.

DOSE.—Half a wineglassful after each meal.

LACTOPEPTINE Wine with Calisaya.

The palatability of this preparation renders it particularly adapted to females, children, and those with weak or delicate stomachs. An elegant and efficacious remedy in Dyspepsia, General Debility, Anæmia and Chlorosis.

Containing: Calisaya Bark, 45 grains, Lactopeptine, 12 grains, per fluid ounce.

DOSE.—Half a wineglassful after each meal.

LACTOPEPTINE with Beef, Iron and Wine.

A valuable nutritive and blood tonic, combined with Lactopeptine. Indicated in Dyspepsia, Anæmia, Constipation, Chronic Diarrhoea, and all wasting diseases.

Containing: Extract of 2 ounces of Beef, Sherry Wine, 1 ounce, Citrate of Iron, 4 grains, Lactopeptine, 16 grains, per fluid ounce.

DOSE.—One tablespoonful after each meal.

LACTOPEPTINE, Syrup.

This preparation will be found superior to all other remedies in Dyspepsia and diseases arising from imperfect digestion. Also particularly valuable in many forms of Diarrhoea, Vomiting in Pregnancy, Constipation, Anæmia, General Debility and Phthisis. Each fluid ounce contains 32 grains of Lactopeptine.

DOSE.—One to two teaspoonfuls after each meal.

LACTOPEPTINE, Syrup Compound.

This preparation will be found well suited to cases of General Debility, arising from impaired digestion, and also of great value in pulmonary affections.

Containing: Lactopeptine, 32 grains, Phosphate Iron, 8 grains, Phosphate Lime, 8 grains, Phosphate Soda, 8 grains, Phosphate Potash, 8 grains, per fluid ounce.

DOSE.—One teaspoonful after each meal.

LACTOPEPTINE, Syrup with Phosphate of Iron, Quinia and Strychnia.

A powerful general and nervous tonic, combining all the valuable properties of Phosphorus, Iron, Quinia and Strychnia, with Lactopeptine. Indicated in cases of extreme Debility, Phthisis, Constipation, Anæmia and depraved conditions of the blood.

Containing: Phosphate Iron, 8 grains, Phosphate Quinia 8 grains, Phosphate Strychnia, 8-32 grain, Lactopeptine, 32 grains, per fluid ounce.

DOSE.—Half to one teaspoonful after each meal.



Canada Branch:—H. P. GISBORNE, 10 Colborne Street, TORONTO.

FOREIGN DEPOTS.

LONDON. (W. C.)

John M. Richards, Great Russell Street Buildings.

FRANCE.

Paris—H. H. Swann, 12 Rue Castiglione.	Biarritz—Jules Moussemple, Place St. Eugene.
" Roberts & Co., Place Vendome.	Nice—J. Daniel, 3 Quai Massena.
" T. P. Hogg, 2 Rue Castiglione.	Mentone—The English Pharmacie, P. Bézos, 27 Rue St. Michel.
Pau—John Jarvis, 4 Rue Serviez.	

ITALY.

Florence—Roberts & Co.	Milan—Menzone & Co.
Rome—Sinimberghi, Via de Condotti.	Naples—Kernot, 14 Strada san Carlo.

BELGIUM.

Agence Générale à la Pharmacie Anglaise de CH. DELACRE,
Montagne de la Cour, BRUXELLES.

Anvers—Pharmacie De Beul.	Liège—Pharmacie Bérard.
Bruges—Pharmacie Dryepondt-Bergeron.	Mons—Pharmacie Carez.
Charleroy—Pharmacie Sohet.	" Pharmacie T. Accarain.
Courtrai—Pharmacie Hulpiaugavier.	Namur—Pharmacie Winand.
Liège—Pharmacie Péters.	St. Trond—Pharmacie Van Horen.
" Pharmacie Gilman.	Tournay—Pharmacie Brame.
" Pharmacie Delbaistaille.	" Pharmacie Delobe.
" Pharmacie Goossens.	" Pharmacie Sykendorf.
	Yprés—Pharmacie Frysou.

GERMANY.

Elmain & Co., Frankfort-o-Main.
John F. Kadow, 94A Gitschinerstrasse, Berlin.
G. F. Ulex, Apotheke, Hamburg.

AUSTRALIA.

Melbourne—Felton, Grimwade & Co.	Dunedin, N. Zealand—Kempthorne, Prosser & Co.
Adelaide—F. H. Faulding & Co.	Wellington, N. Zealand—Felton, Grimwade & Co.
Brisbane—Elliott Bros. & Co.	Christchurch, N. Zealand—Cook & Ross.
Sydney, New South Wales—Elliott Bros.	
Auckland, N. Zealand—Kempthorne, Prosser & Co.	

MISCELLANEOUS.

Cape Town, South Africa—Heynes, Mathew & Co.	Durban, Natal, South Africa—E. J. Challoner.
King Williamstown, South Africa—Townshend & Smith.	Port Elizabeth, South Africa—B. G. Lennon & Co.
Grahamstown, South Africa—H. B. Bell.	Hong Kong—Hong Kong Dispensary.
	Shanghai—Llewellyn & Co.

INDIA.

Bombay, Byculla and Poona—Treacher & Co.
Calcutta—Smith, Stanistreet & Co.
Cawnpore and Meerut—Charles & Co.

